

Temperature-Based Touchless Attendance System Using NodeMCU

Project Report

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Introduction

Traditional attendance systems often require manual entry or contact-based scanning, which can spread infections and are prone to data management issues. The proposed system aims to solve this by providing:

1. Contactless operation using RFID and infrared temperature sensors
2. Automatic attendance recording
3. Cloud storage and visualization through ThingSpeak
4. Health monitoring by screening each user's body temperature

This project combines the capabilities of IoT (Internet of Things) and embedded systems to provide a smart and hygienic attendance solution.

Objectives

1. To design a touchless attendance system using RFID and temperature sensing.
2. To integrate NodeMCU for data processing and Wi-Fi connectivity.
3. To upload attendance data to ThingSpeak cloud for real-time monitoring.
4. To ensure automatic health screening before attendance logging.

Block Diagram with Explanation

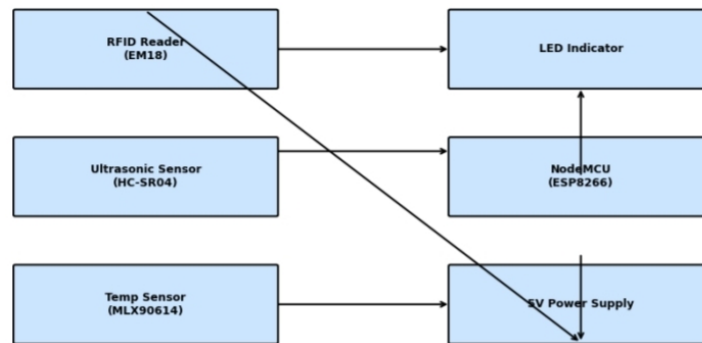


Figure 1: Functional Block Diagram of Temperature-Based Touchless Attendance System

Explanation: The block diagram consists of four main modules — RFID Reader (RC522), Ultrasonic Sensor (HC-SR04), Infrared Temperature Sensor (MLX90614), and the NodeMCU (ESP8266) microcontroller. These components work together to enable automatic, contactless attendance marking with integrated temperature screening.

- **RFID Reader (RC522):** Detects RFID tags to identify authorized users.
- **Ultrasonic Sensor (HC-SR04):** Detects the presence of a person.
- **Infrared Temperature Sensor (MLX90614):** Measures body temperature without contact.
- **NodeMCU (ESP8266):** Acts as the central controller for data processing and cloud communication.

When a person approaches the device, the ultrasonic sensor detects their presence and activates the RFID reader. The RFID tag is scanned while the MLX90614 measures body temperature. The NodeMCU processes and uploads the data (ID, temperature, status) to the cloud via ThingSpeak.

Circuit Diagram and Components

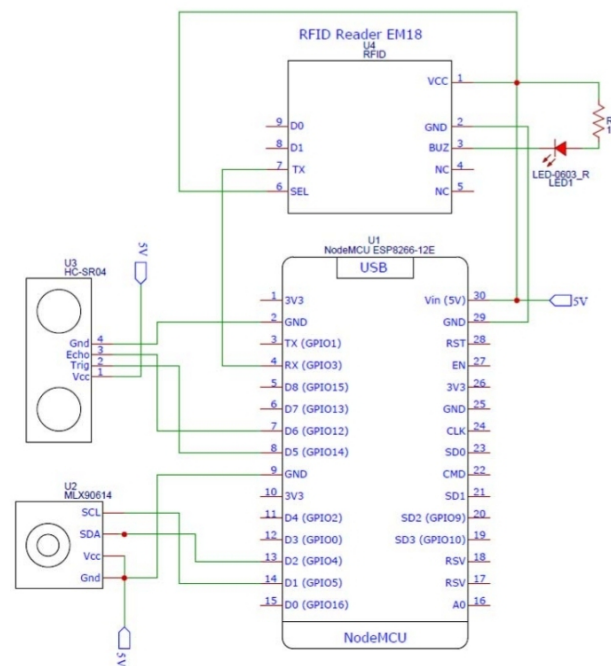


Figure 2: Circuit Diagram of the System

Components Used:

- NodeMCU (ESP8266-12E)
- RFID Reader (RC522)
- RFID Tags/Cards
- Ultrasonic Sensor (HC-SR04)
- Infrared Temperature Sensor (MLX90614)
- Jumper Wires and Breadboard

Working Principle:

1. System initializes sensors and connects to Wi-Fi.
2. Ultrasonic sensor detects presence.
3. RFID reader scans tag ID.
4. MLX90614 measures temperature.
5. NodeMCU evaluates and uploads data to ThingSpeak.
6. System resets for the next user.

Description of the Developed Code

Main Libraries Used

- `<ESP8266WiFi.h>` – Enables Wi-Fi connectivity.
- `<ThingSpeak.h>` – Uploads data to ThingSpeak.
- `<Adafruit_MLX90614.h>` – Reads data from MLX90614.
- `<MFRC522.h>` and `<SPI.h>` – For RFID tag reading.
- `<ESP8266HTTPClient.h>` – For HTTP communication (IFTTT integration).

Code Logic Overview

1. **Setup Phase:** Initialize sensors, Wi-Fi, and ThingSpeak.
2. **Loop Phase:**
 - Detect person using ultrasonic sensor.
 - Scan RFID tag.
 - Measure temperature using MLX90614.
 - Compare temperature with threshold (37.5°C).
 - Upload details to ThingSpeak or Google Sheets via IFTTT.

Image of the Working Model

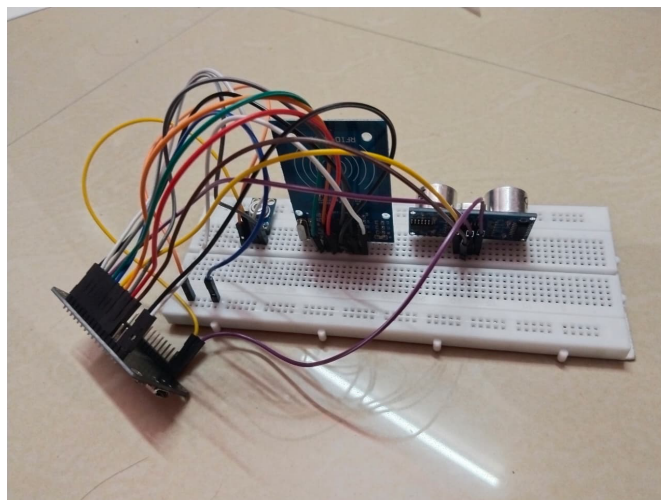


Figure 3: Image of the Working Model

Expected Outputs / Outcomes

The **Temperature-Based Touchless Attendance System** ensures a hygienic, automated, and real-time attendance mechanism.

1. Contactless temperature measurement.
2. Automatic attendance logging with timestamp.
3. Health classification:
 - Temperature $< 37.5^{\circ}\text{C}$ \rightarrow Normal
 - Temperature $\geq 37.5^{\circ}\text{C}$ \rightarrow High Temperature
4. Real-time cloud visualization via ThingSpeak.
5. Auto data entry in Google Sheets using IFTTT.
6. LED indication for alerts.

Example Serial Monitor Output:

Connecting to WiFi...

WiFi Connected!

Person Detected!

RFID UID: 4A7B23C1

Temperature: 36.8°C

Status: Normal

Data Uploaded Successfully!

Overall, this IoT-based system delivers a reliable, real-time, and pandemic-safe attendance solution.